



RHODES HOMES ARIZONA

The Villages at White Hills

Engineering Report

Prepared for:



2215 Hualapai Mountain Road,
Suite H
Kingman, Arizona 86401



Prepared by:



A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

JUNE, 2005

5820 S. Eastern Avenue, Suite 200, Las Vegas, NV 89119

RHODES HOMES ARIZONA
THE VILLAGES AT WHITE HILLS
Engineering Report

**TRANSMITTAL**

TO: Distribution List

DATE: June 10, 2005

PROJECT: The Villages at White Hills - CCN

LOCATION:

PROJECT NO.: 17941.20.00

SUBJECT: The Villages at White Hills, CC&N
Application Water and Sewer

CONTRACT NO.:

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- 1) Rhodes Homes Arizona, The Villages at White Hills – Engineering Report
- 2) Miscellaneous Exhibits:
 - a) Legal Descriptions – The Villages at White Hills – Sewer /Water
 - b) Map CC&N –Exhibit-WH1 – Water/Sewer Boundaries
 - c) The Villages at White Hills – Area Plan
 - d) Regional Hydrogeology, Source of Water Supply, and Projected 100-year Drawdown Impacts in the Vicinity of the Villages at White Hills, Mojave County, Arizona – Report on behalf of Bill Victor and Greg Wallace.
 - e) Addendum to the Regional Hydrogeology, Source of Water Supply, and Projected 100-year Drawdown Impacts in the Vicinity of the Villages at White Hills, Mojave County, Arizona" report on behalf of Bill Victor and Greg Wallace.

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RECEIVED BY: _____ Date: _____

(Upon Receipt, Sign Transmittal & return Stanley Consultants, Inc.)

SIGNED BY: _____ Date: _____

David Woo, P.E.
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Stanley Consultants INC.

A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

June 09, 2005

Rhodes Homes, Arizona
15 Hualapai Mountain Road, Suite H
Kingman, Arizona 86401

Dear Mr. Rhodes:

Subject: Engineering Report - The Villages at White Hills

In accordance with our Professional Services Agreement, Stanley Consultants is pleased to submit this final report, entitled "Engineering Report - The Villages at White Hills.

Sincerely,

Stanley Consultants, Inc.

David Woo, P.E.
Program Manager Rhodes Mohave County Task Force

Attachments(s): See Transmittal

KY:EME

This document was sent electronically



DATE: June 2005

SUBJECT: Rhodes Homes Arizona, LLC
The Villages at White Hills - Ownership Legend

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Las Vegas, NV 89147

Sports Entertainment, LLC
2564 Wigwam Pkwy #233
Henderson, NV 89074

Engineering Report

The Villages at White Hills

Rhodes Homes, Arizona Kingman, Arizona

Respectfully submitted,

Stanley Consultants, Inc.

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Executive Summary

Executive Summary

A Preliminary Engineering Study of approximately 3,000 acres was performed by Stanley Consultants, Inc. The site is located within sections 16, 17, 20, 21, 23, 27 and 30 of Township 27 north Range 20 West in Mohave County Arizona. The property consists primarily of undeveloped cattle grazing rangeland located east of U.S. Highway 93 and adjacent to the Mohave County Highway 145, also known as White Hills Road.

An over-all area wide constraints map with off-site improvements was developed and included as a foldout map. (Refer to Rhodes White Hills Constraints Exhibit.) This exhibit identifies some land ownerships, existing utilities, transportation elements and the drainage features within or near the project.

Stanley recommends that an American Land Title Association (ALTA) survey be performed for the property. The ALTA survey will take into account the known constraints and encumbrances on the property. The ALTA survey is also the first step toward development and subdividing the property. SCI has recently been retained to complete ALTA survey sources and the completed survey will be submitted separate from this report

The property is currently designated as "Rural Development Area" which allows a density of up to 0.2 residential dwelling units per acre. It is our understanding that Rhodes Homes wishes to develop the project into a 'destination development' with a possible golf course and other open spaces. Accompanying this proposed development would be residential areas with proposed densities greater than the current designation. A General Plan Amendment through Mohave County will be required in order to accomplish this plan. With the approval of a Plan Amendment, it will be possible to submit concurrent Zoning Applications; Master Site Plan, Planned Unit Development and Preliminary Plat Applications. Each application however, will require additional

information to accompany them such as traffic studies; infrastructure studies; and environmental studies.

Water/Waste Water

Inclusive within this investigation is research and analysis of the conceptual approaches to water supply and wastewater treatment and disposal. In addition we have developed a conceptual layout of the water and sewer infrastructure in conjunction with the general drainage patterns and their required conveyance facilities.

Preliminary investigation indicates that the only existing water infrastructure within the vicinity of the project are small capacity wells, that are inadequate to support a municipal type water supply system. There is also no community water system within the area that could adequately serve the project.

Currently, no water wells are registered with the Arizona Department of Water Resources (ADWR) within the White Hills Property. There are however, two existing wells located in Section 15 adjacent to the project. In addition, two test wells are currently being developed within the property. As there has been no previous need to investigate well capacities for a master planned community of this magnitude, a definitive conclusion to groundwater quantity and quality adequate to support the planned project can not be made at this time. The regional data appears to indicate however that it is feasible to develop the groundwater resources in the area to service the project with a municipal type water supply.

Three ownership alternatives for the water and sewer system are reviewed with the advantages and disadvantages of each. The developer may choose to contract with a private company or district to own and operate the water and or waste water systems, or may choose to form their own company to own and operate the systems. In contracting with a private company the developer limits his liability but would have to negotiate a contract that allows him to maintain control of the infrastructures development and associated costs. Owning and operating a water and or waste water company would give the developer the most flexibility in the development of the infrastructure as well as providing receipt of future revenues generated. Either alternative would require filing a Certificate of Convenience and Necessity (CC&N) with the Arizona Corporation Commission (ACC) that is time-consuming, and may impact the schedule if the process is not started early in the development process.

A third alternative would be to form a public water or sanitation district that would require extensive legal and political effort to establish.

There is currently no sewer collection system within the project limits. Mohave County does not allow a septic system for lots less than 1 acre in size and no more than 5 connections may be made to any individual system. With the densities being considered for the area, and the lack of any nearby facilities, construction and operation of a waste water treatment plant (WWTP) will be necessary.

Once waste water is treated in a WWTP, the effluent can be discharged to a receiving

stream, infiltrated back into the groundwater or reclaimed for beneficial use. With the intent of developing the project as a “destination development” with possible golf courses, open space and parks, reuse appears to be the most viable alternative. Using reclaimed water to maintain these facilities will reduce ground water withdrawal from local aquifers and provide beneficial use for the effluent generated from the development. Utilization of effluent will however, require pumping from the wastewater treatment plant (WWTP) to the points of use. With the size of this proposed development, enough reuse water should be generated to sustain between 450 and 650 acres of green space.

Drainage

Several major storm conveyance facilities will be needed to protect the development from flood waters during a 100-year storm. The Detrital Wash at White Hills Road currently receives flows of up to 54,000 cfs during a major storm event. To completely pass this flow beneath White Hills Road, a series of thirty one 20-foot by 10-foot Reinforced Concrete Boxes (RCBs) would be required. In addition, a 425-foot by 8.5-foot concrete lined trapezoidal channel with 2:1 side slopes would also be required to replace the Detrital Wash through this reach.

Another major flood consideration is an existing wash that crosses White Hills Road conveying 3,800 cfs. A concrete channel, having a bottom width of 20 feet through Section 21 and expanding to a bottom width of 54-feet through Section 17, will be necessary to convey this flow along its natural alignment. A series of five 12-foot by 8-foot RCBs would be also be required to pass this flow beneath White Hills Road.

Of significant impact to the project is an existing alluvial fan which currently has flows of approximately 6,100 cfs at its apex during the 100-year storm. Since runoff from an alluvial fan can shift across the fan during each storm, a drainage cutoff channel is necessary to intercept the westerly flows along the easterly perimeter. The channel should be adequately sized to accommodate the entire fan runoff flow.

Stormwater from off-site sheds will also need to be conveyed through the project via internal street conveyance or concrete lined channels. Runoff within a street section is limited to a maximum of 8-inches of depth. Stormwater in excess of the street capacity will travel in concrete trapezoidal channels, having a maximum allowable velocity of 30 feet per second. Channels with potential velocity in excess of 30 ft/sec will need to be controlled using strategically placed drop structures.

Traffic

Access to the White Hills area is provided via U.S. Highway 93 and White Hills Road, also known as Mohave County Highway 145. Both U.S. Highway 93 and White Hills Road are paved all-weather access roads. White Hills Road, however, is subject to flooding from the Detrital Wash when the capacity of the six pipe culverts is exceeded and water weir flows over the existing roadway. All other access to and within the site consist of a network of unpaved gravel roads.

U.S. Highway 93 is a four lane, access controlled, divided highway except for the first ten to twelve miles from Hoover Dam on the Arizona side of the Colorado River.

White Hills Road is a two lane unmarked (except near the U.S. Highway 93 intersection) roadway lying within a 100-foot right of way. White Hills Road's primary utilization is for local access by the residents of the White Hills area and for a commercial gravel operation, northeast of the project site.

The intersection of U.S. Highway 93 and White Hills Road is a key element to the traffic operation in the area as the intersections control traffic capacities of roadways. At intersecting major roadways, lane capacity is about 1,200 vehicles per hour per lane. At build-out, White Hills Road will have a through capacity of 6,600 vehicles per hour in each direction. The controlling factor then becomes the intersection capacity which is only 3,600 vehicles per hour in each direction.

The intersection presently operates at level of service "C" during 30th hour demand. The intersection can accommodate the development of about another 200 homes before improvements need to be considered. With the addition of a traffic signal, under current existing intersection geometry the capacity could be increased sufficiently to accommodate an additional 2,600 homes, without any other intersection improvements.

White Hills Road crosses section lines at seven locations throughout the project area. Each section line should have a 100-foot, 6 lane arterial road that will allow conveyance of traffic from the development. Each newly formed intersection should be constructed with dual left turns and dedicated right turn lanes as well.

At complete build-out, White Hills Road will have insufficient capacity with the diminished intersection capacity at U.S. Highway 93. One solution to provide relief would be to extend Selrest Avenue (South section line of section 30) west to U.S. Highway 93, a distance of approximately 4,300-feet. Then at some future point when both of these intersections have reached capacity, a third access point could be created with Rocky Point Avenue, located on the south edge of section 19. By extending the roadway just over one mile, an additional signalized intersection with U.S. Highway 93 can be constructed that will provide even further capacity.

During the project development, the capacity of U.S. Highway 93 will, at some point, be exceeded. According to Mohave County Staff, ADOT will recognize the demand increase and will initiate the design and construction of additional lanes on U.S. Highway 93 to meet the increased demand at that time. The timing of this project, however, will be unpredictable.

Detailed information regarding the aforementioned are provided in the pertinent sections of the report.

Section 1

Introduction

INTRODUCTION

The purpose of this *Engineering Report* is to investigate the feasibility of developing the project's approximately 3000 acres of previously undeveloped cattle grazing rangeland by way of understanding the opportunities and the constraints of the property.

This report contains the results of an investigation of engineering issues and site analysis for existing conditions and future infrastructure alternatives of developing approximately 3000 acres east of U.S. Highway 93 and adjacent to the Mohave County Highway 145, also called the White Hills Road, hereafter called the "Project". The primary land use goal is of residential and/or commercial subdivisions.

The report is divided into the Overview, Existing Constraints, Drainage, Water/Wastewater, and Traffic/Transportation Infrastructure Sections. The Overview section covers the site description, environmental setting and the site history. The Existing Constraints section identifies the land ownership information, existing utilities, transportation elements, the drainage features and the physical constraints of the Project. The Drainage section discusses the existing drainage conditions and the future mitigations in conjunction with development. The Water/Wastewater Infrastructure section identifies the supply and demand issues and the alternatives for development. Finally, the Traffic Impact Analysis/Transportation Infrastructure section contains the transportation elements including the multimodal considerations.

Section 2

Overview

Site Description

The site is currently all open space, consisting primarily of high desert terrain and associated vegetation. The site area is served from the U.S. Highway 93 by Mohave County Highway 145, also called the White Hills Road, near the Rosie's Diner. White Hills Road is paved and intersects U.S. Highway 93 at around Mile Post Marker 29. A network of sand and gravel roads provide access to the site area from White Hills Road, although much of the site is inaccessible without the use of a four-wheel drive vehicle, and some portions of the site are only accessible on foot.

The location of the site is shown on Figure 2-1.

Location

The site is generally located in Sections 16, 17, 20, 21, 23, 27, and 30, of Township 27 north, Range 20 West in Mohave County Arizona. Total area of the site is approximately 3000 acres.

The site is located in an area known as the Detrital Valley, approximately 40 miles northwest of Kingman near the location of the historic town of White Hills.

Description

The site is currently all open space, consisting primarily of high desert terrain and associated vegetation. The site area is served from U.S. Highway 93 by Mohave County Highway 145, also called the White Hills Road. White Hills Road is paved. A network of sand and gravel roads provide access to the site area from White Hills Road, although much of the site is inaccessible without the use of a four-wheel drive vehicle, and some portions of the site are only accessible on foot.

Drainage in the site area is toward the west and north toward the Detrital Wash, which flows northward toward Lake Mead. The wash is typically dry, but can carry significant flow during rainfall events. The area is reportedly prone to flash floods.

Longitude: 114° 25' West
Latitude: 35° 42' North

Adjacent Properties

The properties around the site include scattered residential properties and open spaces. Signs of mining activities, an above ground tank, and local residences were observed in the hills to the east of the site. The mining activities in the White Hills location date to the late 1800's. The area had mining, residential, and commercial activities at that time. Two cemeteries were also reported to be in the area.

Climate

Table 2-1 - Climate

Month	Average Daily Temperature °F		Average Total Precipitation (Inches)
	Daily Maximum °	Daily Minimum °	
January	54.3°	31.4°	1.23"
February	58.8	34.7	1.10
March	63.2	38.4	1.31
April	70.9	44.5	.47
May	80.3	53.0	.31
June	91.1	62.6	.19
July	95.6	69.3	.98
August	94.0	67.8	1.41
September	87.8	61.3	.66
October	76.8	49.6	.81
November	63.1	38.3	.71
December	55.2	31.9	.82
Year Average	74.3°	48.6°	10.0"

Based on a 30 year average (1971-2000) Taken from the office of the Arizona State Climatologist – Location is Kingman No. 2 Arizona (024645)

Record High: 111° F (Tied on July 3, 1967 & July 10, 2003)
Record Low: 4° F (January 29, 1979)

Average Total Snow, Sleet and Hail Annually: 1.5"
Mean Relative Humidity: 39% at 6 A.M., 27% at 6 P.M.
Mean Number of Days with maximums 90° & above: 93
Mean Number of Days with minimums 32° & below: 58
Mean Heating Degree Days: 3224
Mean Cooling Degree Days: 1778

Topography

Local topography varies from lows of approximately 2,400 ft. MSL in Section 19 along the Detrital Wash at the westernmost edge of the site to a high of approximately 3,600 ft. MSL in Section 23 at the easternmost edge of the site.

Drainage from the site is generally to the west and northwest via numerous tributaries of the Detrital Wash, and then north via the Detrital Wash toward Lake Mead.

Geology and Soils

In general, the soils in the site area consist of stratified alluvial valley fill between the local mountain ranges. USDA Soil Conservation Service mapping for the area was not available for our review. Based on field observations, however, the soil on the site is most likely a fine sandy loam, with some occurrences of coarser sands and gravels, particularly near drainage features. These soils are typically well drained, coarse grained soils with a slow infiltration rate, moderate water holding capacity, and a typical depth to the water table of greater than six feet. These soils typically do not meet the requirements for hydric soil. Deeper soils are typically silty clay loams, and gravelly sandy loams. Caliche may also be present in some areas.

Hydrogeology

According to the Arizona Department of Water Resources (ADWR), basin and range aquifers are generally the principal sources of ground water in the site area. These aquifers are present in alluvium-filled basins interspersed between ranges of northwest to southeast trending mountains in the northwest portion of Arizona. The site is located within the Detrital Valley Basin.

The following information was provided by the ADWR.

The Detrital Valley basin encompasses approximately 875 square miles. The basin is bounded by the White Hills and Cerbat Mountains to the east, the Black Mountains to the west, and a low topographic rise to the south that separates it from the adjacent Sacramento Valley basin. The valley floor slopes northward from 3,400 feet to 1,200 feet above mean sea level where Detrital Wash drains into Lake Mead. Maximum altitude in the basin is 7,148 above mean sea level in the Cerbat Mountains.

Groundwater occurs mostly in the basin-fill material and at shallow depths in the alluvial deposits along the mountain washes. Groundwater flows in a northerly direction with depth to groundwater ranging from 20 feet at Lake Mead to over 780 feet below land surface at the south end of the basin. Depth to bedrock exceeds 6,000 feet below land surface at its deepest point. Well yields of up to several hundred gallons per minute have been reported in the basin-fill.

There is an estimated 1.0 million acre-feet of groundwater in storage in Detrital Valley basin with less than 1,000 acre-feet recharged annually. Most of the 190 acre-feet pumped in 1985 were used for domestic purposes. Historical groundwater data is

limited; however, little change in water levels suggests the basin is in a steady-state condition. Most of the groundwater is of suitable quality for domestic and other purposes with only isolated areas containing high dissolved solids and fluoride concentrations.

A search for available ADWR well records was conducted by Stanley Consultants. The search indicated two records of wells within the site area. These were located in the northeast quarter of Section 15 and the southeast quarter of Section 21. The file information for the Section 15 well indicated a well depth of approximately 800 feet. The files indicated a total of 26 well records within Township 27N, Range 20W.

A search of available US Geological Survey records for the site area was conducted by Stanley Consultants. This information indicated an additional four wells in the general site area (within approximately one mile of the site). The depth reported for these wells varied up to 500 feet, with depth to groundwater of approximately 400 feet. It is likely there are other smaller wells in the site area as well that do not appear in the records.

Two airfields and some residential areas were observed approximately one mile to the northwest of the site. Two wells were observed in this area.

Copies of the Regulatory Data Base Search by EDR are provided in a separate report titled *Phase I Environmental Site Assessment, Appendix A*, by Stanley Consultants.

Site History

Review of historical information indicates that past site uses were most likely similar or identical to current site uses. No evidence of previous industrial activities has been found on the site, although such activities did occur to the east of the site. Some very minor waste disposal consisting of random dumping has occurred on the site.

Signs of mining activities, an above ground storage tank, and local residences were observed in the hills to the east of the site. The mining activities in the White Hills location date to the late 1800's. The area had mining, residential, and commercial activities at that time. Two cemeteries were also reported to be in the area. Some of the drainage from the mining areas passes through site as it flows toward the Detrital Wash.

History of the White Hills Town by the Mohave County Museum of History and Arts



The following is a summary of the history of White Hills Town by the Mohave County Museum of History and Arts.

In the winter of 1891, a snow storm was raging and Frank Robinson asked a Hualapai Indian Cowboy who went by the name of Hualapai Jeff to help in driving back some cattle, which had wandered from Gold Basin down the canyon toward the desert below. Hualapai Jeff, while camped for one night in the desert, accidentally found a rich silver float. He said nothing at the time, but in Gold Basin a short time afterward, Judge Henry Schaeffer asked Hualapai Jeff if he knew of any good mine prospects. Hualapai Jeff brought him a specimen and he offered Hualapai Jeff \$200 if he would show him the location.

In May of 1892, Hualapai Jeff accepted the offer. Schaeffer invited John Barnett and John Sullivan to join him for the trip to the location with Hualapai Jeff as the guide. In July of 1892, the Judge told everyone that he had found the original float years before and that he had spent that time since searching for it and that no Indian was involved.

“...the scarcity of potable water and lack of tools slowed its growth only momentarily. The Judge and other miners gathered (200 by the third week) to form the Indian Secret Mining District in order to have an authority available to keep track of claims. A few men gathered in Taggart’s tent store, debated and chose “WHITE

HILLS” as the name of the new camp, versus “INDIAN SECRET” or “SCHAEFFERVILLE.” A latecomer M.L. Vail, went to Prescott for a photographer, and mentioned to the local newspaper it should have been named “SILVERADO”. As more prospectors arrived upon hearing of the “STRIKE”.

The boom was on. Countless buildings were erected in the shape of an “L” about one mile in length, – homes, a school, stores, laundries and 12 saloons (7 in a row on Main Street). Town lots went for \$300. A post office was opened on October 20, 1892 and discontinued in August of 1914.

The rich shipments caught the attention of David Moffat, noted mining man of Denver, Colorado. He sent D.T. Root to investigate and in August 1893, Moffat and Root had consolidated most of the claims into one property under “Moffat-Root Mining Company.” They immediately shipped a ten stamp mill from Denver and had it running early in 1894. At this time 500 men were working on leases, while still more men worked for the company. The mill was successful for two years, when the Moffat-Root Mining Company sold in April 1896 to an English company, called the “White Hills Mining & Milling Company,” for \$1,750,000. The new company gave the more than 500 lessees on the small claims notice to quit, in effect banishing them from the camp. Disposing of the old mill as junk, they built a 40 stamp mill for \$150,000.

A 7-mile, 8” pipe line was constructed to the springs, guaranteed by a “water witch” ignoring the ample water in the mines for the old mill and promise of more in depth. A concrete 1,000,000 gallons capacity reservoir was built, to hold the springs’ water and White Hills was provided with an up-to-date water supply system, including fire hydrants that did not work due to the gravity being insufficient for operation.

A \$150,000 electric plant was constructed. Twenty employee houses were erected and a complete telephone system was installed. All these items cost \$350,000 and even though it was considered wasteful management, the company was enabled to continue substantial production for 4 years because of the large quantity of good ore left by the first company and the lessees.

Despite \$12,000,000 in total ore production for the past six years, by 1898 new strikes had stopped and the rich vein had paid out. Building ceased and the cost of living soared, so miners and families drifted away.

In 1899, those few hardy stragglers that were left were ultimately hit by something more devastating... a flood that inundated the town and its mineshafts. Its destiny was sealed. The telephone line was given over to Chloride. Owners closed everything by 1902. In 1903, a 40 stamp mill was installed for a short revival, and again in 1920. In 1972, a mining company commenced exploration, but found not enough silver to warrant expense of full development.

Today, 100 years after the fold, White Hills is considered a ‘true’ Ghost Town of Mohave County.